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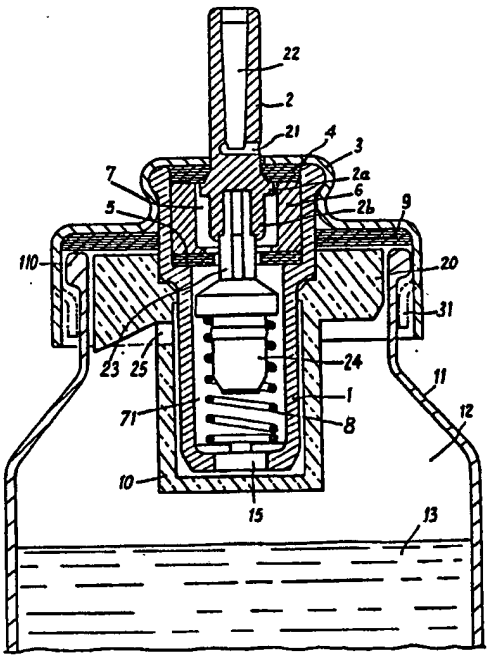
(54) A metering valve for an aerosol with propellant, and usable in the upsidedown position

(57) A metering valve device for a liquid charged with a propellant liquid or liquified gas and intended to be mounted in the neck opening of an aerosol can (11) usable in the upsidedown position, characterized in that at least the bottom portion of the valve (1) is surrounded by a retaining cup (10) which is integrally molded with a ring (20) surrounding the valve and extending between the valve body and the neck of the can, the cup having an opening (25) in the vicinity of the junction between the cup and the ring. The ring (20) isolates the inside of the can from the sealing gasket 9 between the valve (1) and the neck of the can.



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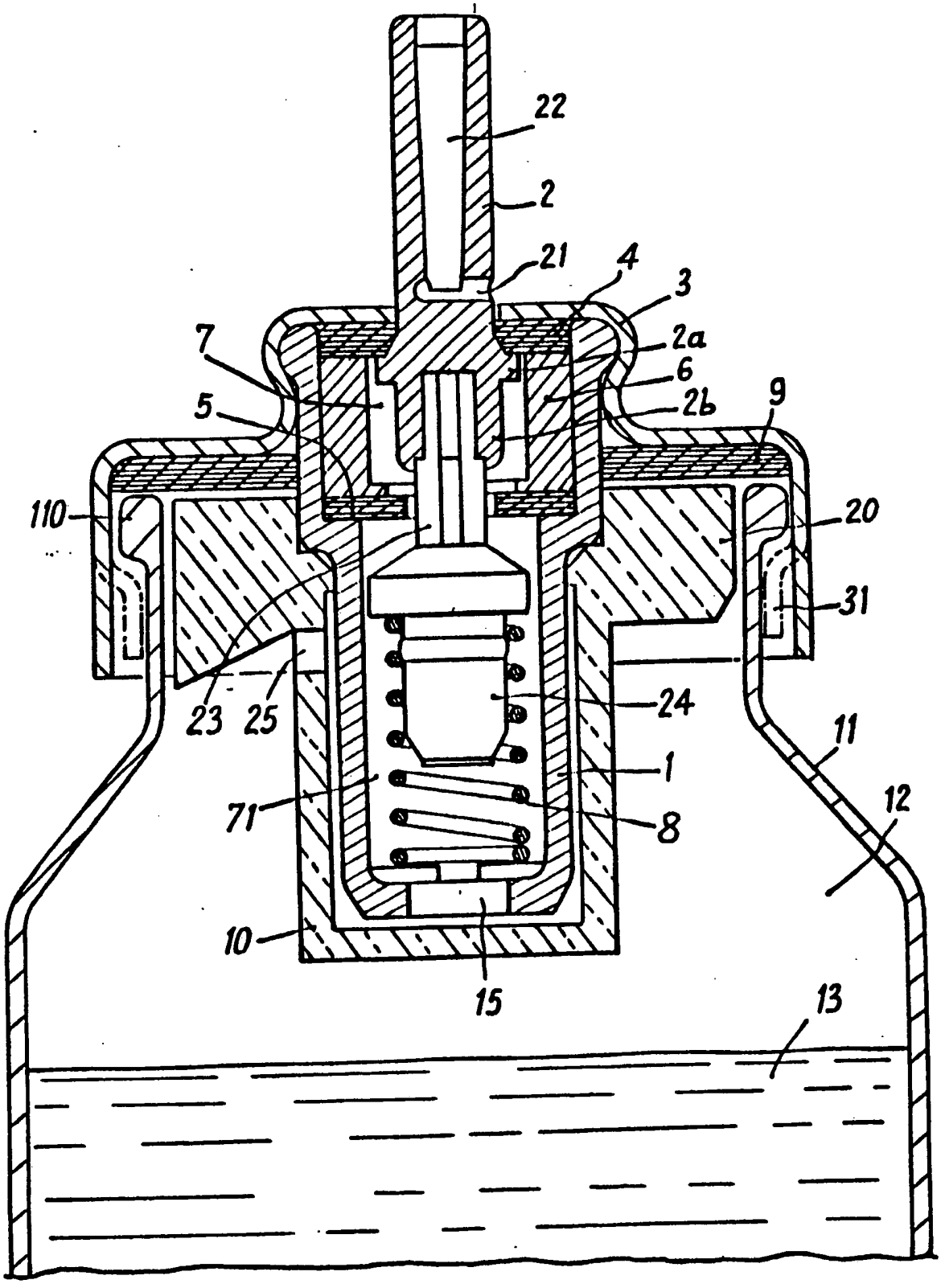
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A METERING VALVE FOR AN AEROSOL WITH PROPELLANT, AND USABLE IN THE UPSIDEDOWN POSITION

The present invention relates to valves for a liquid charged with a propellant liquid or liquified gas and intended to be mounted in the openings of aerosol cans which are usable in the upsidedown position. A valve of this type is described in French patent number 1 225 163, inter alia, and comprises: a valve body open at two ends and containing a metering chamber which is axially delimited by two washer-shaped gaskets, namely a valve gasket and a chamber gasket; and a valve rod passing through the gaskets and movable inside the valve body between a rest state and an actuated state. The valve rod including a shoulder which, in the rest state of the valve is maintained pressed against one of the gaskets by a spring which bears firstly against a shoulder of the valve body and secondly against a shoulder of the valve rod. The outside end of the valve rod includes an axial blind channel which opens out to its outside surface via a radial hole situated at a location such that said hole opens out to the outside of the valve gasket when the valve is in the rest state and to the inside of the valve chamber when the valve rod is pressed into its actuated state, the outside surface of the valve rod being shaped in such a manner that when in the rest state, the metering chamber is capable of being filled by the liquid contained in the can, and when in the actuated state, communication with the can is interrupted such that the chamber empties via the axial channel of the valve rod under the effect of the propellant gas. When such an aerosol device is not in use, the can is normally stood on its bottom. Naturally, this causes the metering chamber which is then at the top of the can close to the can outlet duct to tend to empty, in particular if the metering chamber is of the type which is open in the rest state. When the user next takes the can in the upright position and then turns it upsidedown and actuates the valve at once, there is a danger of an incomplete metered quantity of liquid being expelled, assuming that the metering chamber has emptied partially and that the can is not held upsidedown prior to valve actuation

for long enough to ensure that the metering chamber is completely refilled. Further, if after use, the user turns the can the right way up prior to releasing the pushbutton, then the metering chamber will generally fill with gas, and the next time the can is used, this too will cause an incomplete metered quantity of liquid to be ejected unless the chamber is given time to refill completely prior to actuating the valve.

Preferred embodiments of the present invention provide a metering valve for a liquid charged with a propellant and usable in the upsidedown position, and capable of ensuring that the desired exact measured quantity is expelled, however it may be handled. According to the present invention, this result is obtained by a metering valve device for a liquid charged with a propellant liquid or liquified gas and intended to be mounted together with a sealing gasket in the neck opening of an aerosol can usable in the upsidedown position, at least the bottom portion of the valve being surrounded by a retaining cup, wherein the retaining cup is integrally molded with a ring surrounding the valve and extending between the valve body and the neck of the can in order to isolate the inside of the can from the sealing gasket between the valve and the neck of the can, the cup having an opening in the vicinity of the junction between the cup and the ring.

Advantageously, in a specific embodiment of the invention, the inside diameter of the ring is less than the inside diameter of the retaining cup.

An embodiment of the invention is described by way of example with reference to the sole figure of the accompanying drawing which is a section view through a metering valve in accordance with the present invention, which valve is mounted in the neck opening of a can intended to receive a liquid charged with a propellant gas dissolved in the liquid.

The valve shown differs from a conventional valve by the presence of a retaining cup 10. The use of such a cup is described, in particular, in British patent number 864 694. Otherwise, the valve conventionally comprises a valve body 1 having a valve rod 2 movably mounted therein, said valve rod

being generally constituted by two parts which are force-fitted or welded together in order to facilitate fabrication or assembly. The valve body is crimped to a capsule 3 which holds a valve gasket 4 and a chamber gasket 5 in position, said gaskets being held apart by an intermediate spacer 6 whose thickness serves to accurately determine the volume of the metering chamber 7 between the two gaskets. A spring 8 urges the valve outwardly, with the shoulder 2a pressing against the valve gasket 4. A sealing gasket 9 ensures that the neck of a can 11 is sealed after being crimped at 31 to the outside edge of the capsule 3.

This valve is conventional. When the valve rod 2 is depressed, a thicker portion 2b closes the opening through the chamber gasket 5, thereby closing the metering chamber 7, and thereafter the opening 21 to the axial channel 22 through the valve rod appears in the metering chamber 7 which is then emptied under the effect of pressure from a propellant gas (Freon) dissolved in the liquid filling the chamber.

When the valve is the right way up, or at rest, with the can standing on its bottom, the valve is entirely in a gaseous atmosphere 12 above the liquid 13 which fills the can up to a certain level. In the absence of the cup 10, the chamber 7 would normally empty. If the aerosol is then used, the can is turned upsidedown and the submerged valve fills with liquid via the opening 15 in the bottom of the valve body. However, if the valve 2 is depressed too soon after turning the can upsidedown, then the chamber 7 will be incompletely filled with liquid and the quantity expelled will be incomplete, since a non-negligible length of time is required to enable the liquid to fill the chamber 7 via the opening 15 and the gap in the opening through the chamber gasket 5 which is partially closed by a narrow portion 23 of the valve rod 2.

As described in the above-mentioned British patent, the bottom portion of the valve (when observed in the right way up position, at rest) is surrounded by a retaining cup 10 which is open only at its top portion at 25. Operation is then modified as follows. The user turns the can 11 upsidedown in order to

expell a metered quantity of the liquid substance containing a dissolved propellant gas. In this upsidedown position, the liquid fills the entire valve: the metering chamber 7, the bottom portion 71 of the valve body containing the spring 8 and the guide end 24 of the valve rod, and the annular intermediate space 72 between the valve body 1 and the cup 10. If the can is turned back the right way up, the volumes 7, 71, and 72 do not empty since there is no inlet for air from the top portion of the valve, and the cup 10 retains the liquid even if the level of the liquid lies below the level of the opening 25. As soon as the valve is actuated, the valve will immediately expell a full metered dose of the substance.

In accordance with the present invention, the cup 10 is molded integrally with a ring 20 which fits between the valve body 1 and the rim 110 of the can. This ring, which is known per se, for example from U.S. patent number 4 349 135, isolates the contents of the can 11 from the sealing gasket 9, thereby preventing the gasket from being deteriorated by the liquid, and simultaneously preventing the liquid from being polluted by coming into contact with the gasket. In addition, this ring (which may have a flared bottom surface, see lefthand side of the figure), also serves to ensure that the contents of the can is completely emptied without wasting any liquid suitable for being expelled. By using a ring whiwh is integral with the retaining cup, manufacture is made simple, cheap and reliable, and is readily industrialized.

Naturally, the present invention is not limited to the examples described above, and indeed it may be modified and varied in ways which will appear to the person skilled in the art.

CLAIMS

1/ A metering valve device for a liquid charged with a propellant liquid or liquified gas and intended to be mounted together with a sealing gasket in the neck opening of an aerosol can usable in the upsidedown position, at least the bottom portion of the valve being surrounded by a retaining cup, wherein the retaining cup is integrally molded with a ring surrounding the valve and extending between the valve body and the neck of the can in order to isolate the inside of the can from the sealing gasket between the valve and the neck of the can, the cup having an opening in the vicinity of the junction between the cup and the ring.

2/ A device according to claim 1, wherein the inside diameter of the ring is less than the inside diameter of the retaining cup.

3/ A metering valve device substantially as herein described with reference to and as illustrated in the accompanying drawing.

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